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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/067,708	02/04/2002	Richard N. Wright	B-108	7476

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EXAMINER
JOHNSTON, PHILLIP A

ART UNIT	PAPER NUMBER
2881	

DATE MAILED: 01/30/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/067,708	WRIGHT ET AL.	
	Examiner	Art Unit	
	Phillip A Johnston	2881	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-42 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-42 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☒ The proposed drawing correction filed on 28 May 2002 is: a)☒ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

Detailed Action

Claims Rejection – 35 U.S.C. 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which the subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,756,871 to Mallener, in view of Branagan, U.S. Patent No. 6,125,912, in further view of Papai, U.S. Patent No. 4,780,268, and in still further view of Lavernia, U.S. Patent No. 5,980,604.

3. Regarding Claims 1-4,7, 21-23, 32,41 and 42, Mallener (871) discloses a method for storing spent nuclear fuel elements, where after removal of spent nuclear fuel elements at 10 from a nuclear reactor core 11, the spent fuel is sprayed with a solution 22 or with an emulsion 13 or is immersed in either or is coated with a melt 14 containing gadolinium or some other substance with a high neutron cross section to form an absorbent coating which is dried at 15 and 16 or solidified by cooling as

shown at 17. The coated spent fuel particles are then further coated with a water-repellent film 18 before they are subjected to storage at 19 for decay. See Column 4, line 21-31.

Mallener (871), does not teach that the water–repellant film overlying the neutron absorbent coating is a corrosion resistant coating. Branagan (912); however, discloses a key to developing new neutron absorber materials is the successful incorporation of rare earth elements into a passive matrix phase, which will provide high resistance to electrochemical attack, such as corrosion, oxidation and leaching. One way to do this is to utilize noble metals, incorporating elements such as Ni, Cr, Mo, Ag, Co and Cu, since these elements contribute very good intrinsic resistance to corrosion in crystalline materials. Nickel and copper are face-centered cubic metals which means that they should form a matrix phase having high ductility and good mechanical forming characteristics as well as having good corrosion resistance. Also in Fe, Ni or Cu base metal systems, rare earth addition results in favorable alloying behavior from a physical metallurgy standpoint. See Column 4, line 9-23.

Hence, it would have been obvious to one of ordinary skill in the art that the Mallener (871) method for storing spent nuclear fuel elements could be modified to include the corrosion resistant coating of Branagan (912) to improve safety during storage and transport of the nuclear fuel elements.

Mallener (871) also does not disclose a nickel-based alloy substantially free of neutron absorbing material. Branagan (912); however, teaches that the compositional ranges to be utilized are determined by the required neutron absorption

characteristics, and the corrosion, physical and mechanical properties. Also, numerous experimental studies have been conducted at the Idaho National Engineering and Environmental Laboratory to develop appropriate composites and to understand the relevant physical metallurgy, physical characteristics and electrochemical properties of various amorphous metallic glasses and noble base nano/microcrystalline materials containing Gd. Table 1 shows the compositions and microstructure features of melt spun ribbons and atomized powders containing (1 and 8%) gadolinium. See Column 4, line 51-67, Column 5, line 2-4.

It is implied herein that a nickel based coating with a 1% concentration of gadolinium according to Branagan (912) above, is equivalent to a "top layer of nickel-based alloy substantially free of neutron absorbing material", as recited in Claims 7, 32, and 42.

It would have been obvious to one of ordinary skill in the art that the Mallener (871) method for storing spent nuclear fuel elements could be modified to include the 1% Gd, Nickel-based, coating of Branagan (912) to improve its corrosion, physical and mechanical properties.

4. Claims 5,6,8-20, 24-31, and 33-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Mallener (871) in view of Branagan (912), as applied to Claims 1-4,7, 21-23,32,41, and 42, in further view of Papai (268).

Papai (268) discloses a ceramic neutron absorbing coating utilizing industrial cermets composed largely of the refractory ceramics aluminum oxide and/or zirconium oxide and metallic aluminum and/or zirconium, with significant

quantities of other oxides used as binders, such as borated glass. Minor levels of additional constituents found in the clay additions utilized, are also present. These cermets are used in applications requiring heat resistant or chemical resistant coatings such as jet exhausts or heat exchangers. See Column 2, line 17-26.

It is implied herein that the use of cermets in the applications referenced above, constitute coatings, which are resistant to highly corrosive environments.

Papai (268) discloses in FIG. 1 a cross section of a neutron absorber element 1. The absorber element is comprised of a refractory coating 5 adherently bonded to a ductile metallic substrate 10. The substrate 10 may be any ductile metallic material meeting intended service requirements, and is preferably selected from those materials conventionally used in the enameling and cermet coating arts. As is common practice in the enameling and cermet coating arts, a nickel flash (i.e. thin coating) may be applied to the steel substrate prior to application of the refractory coating . This is a common method of increasing surface adhesion between the substrate and coating, but is not necessarily applied for all coatings or designs. Coating 5 contains: about 10 to about 50 wt. % gadolinia; borated glass at levels normally found in industrial cermets; alumina and/or zirconia; metallic aluminum and/or zirconium; and minor levels of inorganic clay constituents. The coating thickness CT is preferably substantially uniform and is preferably between about 0.004 to about 0.025 inches, and more preferably between about 0.008 and 0.016 inches. See Column 4, line 19-56, and Column 5, line 4-7.

Papai (268) also discloses a refractory coating composed essentially of: gadolinia; clay constituents; a borated glass; and a metal and a refractory oxide of said metal selected from the group consisting of aluminum and alumina, and zirconium and zirconia, alone or in combination with each other, as recited in Claims 19 and 25. See Column 12, Claim 8.

Papai (268) further discloses a steel sheet substrate, which has a refractory cermet coating on each of its major surfaces, and each coating has a thickness and gadolinia concentration sufficient to assure that there are at least about 0.02 grams gadolinia per square centimeter of surface. Preferably the maximum thickness of the neutron absorber element according to the present invention is about 0.19 inch or less. The Papai (268) invention further includes a shipping container and its internal structure including the aforementioned refractory coated neutron absorber elements. The shipping container according to the present invention may be loaded with two fuel assemblies each containing U^{235} concentrations in excess of about 3.65 weight percent U^{235}, and preferably in excess of about 4.3 weight percent U^{235}. See Column 3, line 36-58.

Papai (268) still further discloses that the absorber elements may be used in new shipping container designs as well as old, already licensed designs. The absorber elements may also be used wherever the storage and handling of fissile materials will benefit by neutron shielding. It is specifically contemplated that the absorber elements may be incorporated into the structures used to handle and store

spent nuclear fuel assemblies , as recited in Claims 26 and 27. See Column 9, line 61-68.

Branagan (912) also discloses that Iron based systems are especially useful for spray coating by processes such as high-energy plasma (HPS), low pressure plasma spraying (LPPS), high-velocity oxyfuel (HVOF), and other spray forming processes on existing steel surfaces such as storage containers and steel drums, as recited in Claims 36 and 37.

Mallener (871) in view of Branagan (912), in further view of Papai (268) as applied above, does not disclose a graded coating layer, as recited in Claim 13; however, Lavernia (604) discloses a spray atomization molten metal coating method wherein a layered, functionally graded pore structure can be generated by modulating microsphere coinjection rates as a function of time. Furthermore, it is possible to coinject different size microspheres at different points and times to obtain further types of graded porous structures. See Column 9, line 14-18.

As a result, it would have been obvious to one of ordinary skill in the art that the Mallener (871) in view of Branagan (912), in further view of Papai (268) coating and spray method, thereby influencing the concentration of certain elements at the surface and thus effectively provide passivation, if so desired.

Conclusion

5. Any inquiry concerning this communication or earlier communications should be directed to Phillip Johnston whose telephone number is (703) 305-7022. The examiner can normally be reached on Monday-Friday from 7:30 am to 4:00 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiners supervisor John Lee can be reached at (703) 308-4116. The fax phone numbers are (703) 872-9318 for regular response activity, and (703) 872-9319 for after-final responses. In addition the customer service fax number is (703) 872- 9317.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703 308 0956.

PJ
January 16, 2003

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